

User Manual

Conductivity and temperature transmitter **LSP-TCT-WIFI**

CE

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PREFACE

Thank you for selecting our isolated signal converter splitter.

This User Manual contains information needed for proper installation, operation, and maintenance of your product. A thorough understanding of these simple instructions will help you get the most of your product.

This document should be read thoroughly, and the safety instructions described in this manual should be followed carefully. If you have questions or concerns about the operation and maintenance of this product, please contact our customer support.

Should a problem arise with the product, check if you followed the installation steps correctly. If the problem persists, contact an authorized Levtech dealer or our customer support.

All information in this User Manual is based on the latest product information available at the time of printing approval. Levtech reserves the right to make changes at any time without notice and without incurring any obligation.

Please always keep this manual together with the isolator as a reference to everyone who uses this product.



Document Revisions

Date	Version Number	Document Changes
03-11-2021	1.0	Initial draft
04-13-2021	2.0	Overall improvements
04-15-2021	3.0	Application examples added

Approvals

This document requires following approvals:

Name	Title
Levi Mihaly	General Manager



1. INTRODUCTION

1.1. General Information

This manual is the designated User Manual for the installation, safe operation, and maintenance of your product. It is divided into nine chapters covering general information, safety instructions, how to safely install and operate the product, maintenance, warranty, and contact information.

All personnel involved in the installation, operation, and maintenance of this equipment should read and understand this manual, particularly its safety instructions. Substandard performance and longevity, property damage, and personal injury may result from not knowing and following these instructions.

In order to ensure long product life, Levtech recommends that you utilize the product and perform maintenance by correctly following the instructions described in this guide. The manufacturer's warranty does not cover any damage resulting from the neglect of these instructions.

Levtech assumes no liability for damage caused by operation contrary to what is specified in this operating manual.

1.2. Support and Services

For information about further questions that are not answer in this manual, additional materials, and support, please contact:

- Q Lueta Nr. 319, Romania
- +40758576007
- office@levtech.ro
- www.levtech.ro

1.3. Disposal Remarks

DO NOT dispose of the outboard motor with domestic waste!

Electronic devices have to be disposed of according to the regional directives on electronic and electric waste disposal. In case of further questions, please consult your supplier. The supplier may take care of proper disposal.



2. SAFETY INSTRUCTIONS

2.1. Symbols

	This symbol indicates information that, if ignored, could result possibly in personal injury or even death due to incorrect handling.
	This symbol indicates information that, if ignored, could possibly result in personal injury or physical damage due to incorrect handling.
NOTICE	Indicates information considered important, but not hazard-related.

2.2. Receipt and unpacking

Unpack the device without damaging it and check whether the device type corresponds to the one ordered. The packing should always follow the device until this has been permanently mounted.

2.3. Environment

Avoid direct sunlight, dust, high temperatures, mechanical vibrations and shock, and rain and heavy moisture.

2.4. Mounting

- Only technicians who are familiar with the technical terms, warnings, and instructions in the manual and who are able to follow these should connect the device.
- Mounting and connection of the device should comply with national legislation for mounting of electric materials, i.e. wire cross section, protective fuse, and location. Descriptions of input / output and supply connections are shown in this installation guide and on the side label.
- Use this device only in accordance with this instruction manual, as well as all applicable local and national laws and regulations. Only allow this device to be installed, operated, maintained, repaired, etc. by others who have also read and understood the user manual.
- Do not allow minors, untrained personnel, or personnel suffering from physical or mental impairment that would affect their ability to follow this manual to install, operate, maintain, or repair this device.
- Any untrained personnel who might be near the device while it is in operation MUST be informed that it is dangerous and fully instructed on how to avoid injury during its use.



MARNING

To avoid the risk of electric shock and fire, the safety instructions of this guide must be observed and the guidelines followed.

2.5. Cleaning

When disconnected, the device may be cleaned with a cloth moistened with distilled water.

WARNING

- The specifications must not be exceeded, and the device must only be applied as described in the following.
- Do not use the device near water or moisture.
- Do not install near any heat sources such as radiators, stoves or other heaters that produce heat.
- To prevent ignition of the explosive atmospheres, disconnect power before servicing and do not separate connectors when energized and an explosive gas mixture is present.
- Do not mount or remove devices from the power rail when an explosive gas mixture is present.
- Before the commissioning of the device, this installation guide must be examined carefully, and only qualified personnel (technicians) should install this device.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

CAUTION

To avoid the risk of explosion due to electrostatic charging of the enclosure, do not handle the units unless the area is known to be safe, or appropriate safety measures are taken to avoid electrostatic discharge.



3. INSTALLATION AND WIRING

The module is designed to be installed, in a vertical position, on TS-35 DIN rail. For the best module performance and duration, avoid placing objects that could obstruct the ventilation. Never install the modules near heat sources.

3.1. Installation on TS-35 DIN Rail

Inserting the Module in the Rail:

1) Attach the module in the upper part of the rail, as shown in the left figure below. 2) Press the module downwards.

Removing the Module in the Rail:

1) Apply leverage using a screwdriver, as shown in the left figure below.

2) Press the module upwards.



3.2. Connections with Screw Terminals

The module has been designed for screw-type terminal electrical connections. Proceed as follows to make the connections:

1) Strip the cables by 8mm.

2) Insert a screwdriver in hole, unscrewing the screw.

3) Insert the cable in the round hole.

4) Again, use the screwdriver to tight the screw.

5) Remove the screwdriver and make sure that the cable is tightly fastened in the terminal.

Ø 0,2...2,5 mm²





4. DESCRIPTION

The LSP-TCT-WIFI conductivity transmitter is designed to measure the conductivity, resistivity and temperature of the liquids with the corresponding sensor. This instrument is suitable for high-purity water monitoring and water treatment applications, such as reverse osmosis or ion exchanger. With its DIN rail mountable housing, it is easy to install into industrial environments. Configuration of the parameters can be easily done by accessing the device through its WiFi connection.

5. FEATURES

- WiFi connection for configuration
- MODBUS
- Conductivity, resistivity and temperature measurement
- Configurable signal output for the conductivity (0 -20mA; 4-20mA; 0-24mA; 0-10V) Configurable signal output for the temperature (0 -20mA; 4-20mA; 0-24mA; 0-10V)
- Switching digital output Relay (Switching point is configurable)
- Cyclical self calibration
- Linear temperature compensation
- Electrically isolated input, output and supply
- DIN rail mounting
- Compensation of the cable capacity
- Calibration of the cell constant







6. SPECIFICATIONS

Input 1	
Input type	Resistive 2 electrode conductivity sensor
Conductivity cell types	k=0.01; k=0.1; k=1; k=10
Input 2	
Input type	Temperature sensor
Temperature sensor types	Pt100, Pt1000, NTC, PTC
Analog Output 1 Conductivity	
Output Signal type	0-10V; 4-20mA; 0-20mA
Output Resistance 0-20mA or 4-20mA	>75Ω
Output Resistance 0-10V	>1kΩ
Analog Output 2 Temperature	
Output Signal type	0-10V; 4-20mA; 0-20mA
Output Resistance 0-20mA or 4-20mA	>75Ω
Output Resistance 0-10V	>1kΩ
Digital output	
Relay contact	0.5A 24 VDC/AC
General	
Output/ Input isolation	2800V
Output accuracy 0 to 200uS/cm	+/-0.02 uS/cm
Output accuracy 0 to 2000uS/cm	+/-0.1 uS/cm
Response time	0.8ms
A/D Converter resolution	16 bit
Output accuracy -20 to 100 °C	0.5 °C
Power Supply	
Supply Voltage	12 ~ 30VDC
Power Consumption	<25mA
Over Voltage surge protection	36V
Reverse-Polarity Protection	Yes
Enclosure	
IP Rating	lp20
Dimensions (L x D x H)	114.5 x 99 x 22.5 mm
Weight	114g
Mounting	TS-35 DIN
Maximum Cable Cross-Section	2.5mm ² (max.)
Enviromental Conditions	
Ambient Temperature Range	-10 ~ +60°C
Storage Temperature Range	-30 ~ +80°C
Humidity Level	0 ~95% RH at 40°C, no condensation





Terminal number	Туре	Description
1	Input	Temperature sensor wire
2	Input	Sensor shield
3	Input	Conductivity sensor wire
4	Input	Conductivity sensor wire
5	Input	Temperature sensor wire
6	Input	Temperature sensor wire
7	Communication	Rs485 B
8	Communication	Rs485 A
9	Output	Temperature value milliamp output
10	Output	Temperature value voltage output
11	Output	Conductivity value milliamp
12	Output	Conductivity value voltage output
13	Supply	0VDC
14	Supply	24VDC
15	Output	Relay output
16	Output	Relay output

LE

СН



8. DIMENSIONS





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Beállítások Wi-Fi	
Wi-Fi	
 Conductivity Nem biztonságos hálózat 	? (i)
SAJÁT HÁLÓZATAIM	

orange	14	1:53	@ 35% 🗩
192.168.	4.1	8	Mégsem
Google	keresés		
Q 19:	2.168.4.1		

Con	ductiv	rity
Impedance	20535764.00	oHm
Conductivity	0.00	uS/cm
TC_Conductiv	0.00	uS/cm
Temperature	-259.74	С
	Fw 1.01 2021	
	Setup	



Step 0

Before starting configuration, you need to connect to a power supply. After 8 short blue blinks, the **Power LED** turns a stable red. Press and hold the **WiFi/Init** button gently on the device until the LED starts blinking blue.

Step 1

While the LED is blinking, turn on the WiFi on your phone/computer and connect to "**Conductivity**" network. There is a 1,5 minutes time limit that should be respected. After that, the LED turns stable red again.

Step 2

After a successful connection, scan the QR code from the faceplate of the device or open your browser on your phone/ computer and type **192.168.4.1** IP address in the searching line.

Step 3

When the page is loaded, the power LED becomes stable blue, click on the "**Setup**" button.

Step 4

It's required to type in the username and the password and click on Login button.

Username: **admin** Password: **password**



If the connecting was successful, the flashing blue light becomes to a stable blue light on the transmitter and you are able to change the parameters to set up your device correctly. If the LED turned red before get connected, the steps should be repeated trying to fit into the 1,5 minutes time limit.

On the **SETUP PAGE** there are informations about the transmitter, like the serial number and the firmware version.

Next, there are the actual values measured by the transmitter in real time:

- Impedance (measured in Ohms)
- Conductivity (uS/cm)
- Conductivity TC (uS/cm)
- Temperature (C)

Below, there are all the settings that can be modified by clicking on the 6 buttons(Measuring, Analog, Relay, Temperature, Modbus, Calibration) or just scrolling down.

On the very bottom of the screen, the user can Load and Save the parameters or Logout from the setup page by clicking on them.

By clicking on the Load button, the actual parameters will appear in the windows. With the Save button, the new parameters can be saved.

SET	UP	PA	GE	4	
Serial Nr			FW		
1			1.32		
Impedance Co (oHm) (onductivi uS/cm)	Condu TC(uS	uctivi 5/cm)	Ten (C	np)
20444272.0	0.00	0.0	0	-259	.74
Measurin	g Ana erature	alog Mod	Rela bus	ay	
	Calibrat	tion			





Start	0.500
Frequency(kH	2,500
Frequency increment(Hz)	2,00
Frequency repeat	50
Settling cycle	Cycle x1
Settling time	1
K Factor	0,1000
Reference Temperature(C	25

Settling time

How long is the Settling time.

K Factor

It's given by manufacturer of the probe that's used

Reference Temperature

It means the temperature that the conductivity will be corrected to. In the given screenshot, the value is 25 Celsius degree.

Measuring parameters

Start Frequency(kHz)

Before the measuring, it can be set the start frequency, where the measuring starts.

Frequency Increment(Hz)

This value is added to Start Frequency in every measuring cycle.

Frequency repeat

It means that how many measures wanted to be performed.

Settling cycle

How many times will be applied the settling time after every measurement.





Analog

Configuration of the analog outputs

DAC - Digital to Analog Converter It can be selected the type of the output between :

- 0-10V
- 4-20mA
- 0-20mA
- 0-24mA

It changes the analog output of temperature and conductivity outputs at the same time.

By default, it shows the last loaded type.

тс

We can select the temperature compensation type. Two possible options here:

- TC-NO no compensation
- TC-LIN linear compensation

Conductivity High(uS/cm)

Assign the desired upper limit of the conductivity value to the upper limit of the analog output. For example, if you want the analog output to be 20 mA, when the measured conductivity is 200uS/cm we select the 4-20 mA output for the DAC and enter 200 in the "Conductivity High" window, then "Save".

Conductivity Low(uS/cm)

Assign the desired lower limit of the conductivity value to the lower limit of the analog output. In that case, if you want to 100uS/cm corresponds to 4 mA, you need to select the 4-20 mA output for the DAC and enter 100 in the "Conductivity Low" window, then "Save".

Temperature High(C)

Assign the desired upper limit of the temperature value to the upper limit of the analog output. For example, if you want the analog output to be 20 mA, when the measured temperature is 95 C degree, it should be select the 4-20 mA output for the DAC and enter 95 in the "Temperature High" window, then "Save".

Temperature Low(C)

Assign the desired lower limit of the temperature value to the lower limit of the analog output. Same operation as for the upper value, only the lower value entered here.



Switching oint(uS/cm)	150,00
Switching ysteresis(%)	5
Relay switching mode	Cond_H v



Configuration of the relay output

Switching point

The switching value of the relay output must be entered here.

Switching hysteresis: The switching hysteresis of the relay output can be specified as a percentage. Example: Relay switching mode: Cond_H Switching point: 100μ S/cm Switching hysteresis: 10%This means that 10% of 100μ S/cm is 10μ S/cm, subtracting 10μ S/cm from 100μ S/cm is 90μ S/cm. When the measurement reaches 100μ S/cm, the relay turns on and until the conductivity drops below 90μ S/cm, the relay remains on.

Relay switching mode

Configure the relay output. From the drop-down window, select the mode in which you want to use the relay output (Cond_H, Cond_L, Temp_H, Temp_L, TC Cond_H, TC Cond_L)

Example: Select Cond_H and when the conductivity measured value (uncompensated value) exceeds the value entered in the Switching point window, the relay switches. If the Cond_L mode is selected, the measured conductivity value (uncompensated value) must be less than the value entered in the Switching point window for the relay to switch. Temp_H and Temp_L work just like Cond_H and Cond_L, only it switches based on the temperature measurement value. TC Cond_H and TC Cond_L takes the temperature compensated value into account for switching.





Temperature

Configuration of the temperature probe

Sensor Type

Here it can be selected the type of the temperature sensor used between:

- Pt100
- Pt200Pt500
- Pt1000
- NTC10000

NTC_Beta

This value is given by the manufacturer of the sensor. Applied when NTC10000 sensor type selected.

Temperature Offset

Fine tuning for temperature measurement.

ooninguration of th	e modbus:	
Address	2	
Baud rate	57600 🗸	
Parity	ODD v	
Stop bit	TWO	

Modbus

Configuration of the modbus

Address

It can have an address up to 255

Baud rate From 4800 to 115200

Parity ODD or EVEN

Stop bit ONE or TWO stop bits

Input Registers

From	То	Name	Format
0x0000	0x0001	Conductivity	32bit Float
0x0002	0x0003	Conductivity TC	32bit Float
0x0004	0x0005	Temperature	32bit Float
0x0006	0x0007	Impedance	32bit Float





Calibration

Wire resistivity compensation

The resistance value of the conductivity probe wire must be specified. Entering this value correctly will affect the result of the temperature measurement.

Wire capacity compensation

If non-automatic cable capacity compensation is used, the impedance value measured with a dry probe must be entered here. This eliminates the effect of cable capacity on the measurement.

TC compensation constant

- Acids: 1.0 1.6% /°C
- Bases: 1.8-2.2% /°C
- Salts: 2.2 3.0% /°C
- Drinking water: 2.0% /°C
- Ultra pure water: 5.2% /°C

Reference fluid

If the probe K factor is not specified, the meter can be calibrated using a reference fluid. This value should only be entered during calibration, otherwise it will result a false calibration and the measurement will not be real. When the conductivity probe is in the reference fluid at 25 degrees Celsius, you can enter the value of the reference fluid and calibrate the instrument by pressing the **Send** button. After this operation you can see, that the value of the K factor has changed.

Changing these datas, need to consulting a specialized person.



10. DEFAULT CONFIGURATION

To reset the transmitter to factory settings, it can be performed by turning off the device, then restart it. When it starting up, the blue light starts blinking. During the blinking time, needed to press the configurator button and all the saved datas will be resetted.

To perform the resetting, follow the steps below.

Step 1

Disconnect the transmitter from the power source. It has to turn off.

Step 2

Reconnect the power supply.

Step 3

At this step, need to be quick, because from the moment as it get powered up, 3 seconds is given to push and hold the **WiFi/Init** button for 2 seconds to reset the device to the factory values.



11. FUNDAMENTALS OF CONDUCTIVITY MEASUREMENT

Principle of measurement

Electrolytic conductivity measuring cells basically consist of two metal plates arranged opposite each other which are immersed in the solution to be measured.

The conductivity of the solution is determined through the measuring voltage and the resulting measuring current. The current between the metal plates depends on their geometry (distance and area). The cell constant describes this dependence. Subject to manufacturing tolerances, or because of dirt or wear, the real cell constant of a measuring cell often deviates from its nominal value. This deviation is reflected by the relative cell constant that is adjustable on the conductivity transmitter.

The conductivity of a solution depends on temperature (i.e. the conductivity of a solution increases with rising temperature). The temperature coefficient of the solution describes the dependence of conductivity and temperature. Since conductivity is not always measured at the reference temperature, automatic temperature compensation has been integrated. The transmitter uses the temperature coefficient to calculate the conductivity that would be present at the reference temperature from the current conductivity and the current temperature, and then display this value. This process is called temperature compensation. Modern transmitters offer various variants to carry out this temperature compensation:

- Linear compensation (constant temperature coefficient)

This type of compensation can be used with normal water with an acceptable level of accuracy. The temperature coefficient used is then about 2,2% /K.

- Natural water (DIN EN27888 or ISO 7888 as the case may be)

In this case, a so called non-linear temperature compensation is used. According to the above standard, the corresponding type of compensation can be applied in the case of natural ground water, mountain spring water and surface water. The conductivity of the water is compensated in the range from 130°C to 36°C.

- Non-linear

Here, the actual graph of the temperature coefficient during a heating-up or coolingdown process is determined by the transmitter.



12. ELECTRICAL DIAGRAMS

The electrical connections of the temperature/conductivity sensors may vary according to their structure and the numbers of the conductors. They could be separated, compensated and/or shielded. In order to be decided which connection will be selected.





Variant 3



Variant 4



23

H



12. ELECTRICAL DIAGRAMS

Variant 5



Variant 6





13. APPLICATIONS

The conductivity transmitter is used in water treatment applications, it measures the conductivity of the water and transmits the value to the processing unit on analog signal or using modbus communication. The transmitter is usually installed in an electrical cabinet near to the sensor and the signal can be transmitted further to the processing unit.

Example 1:

There is a water treatment facility for drinking water. The water comes into the facility from the mountain in a certain temperature and the conductivity of the water is measured at the entry tank and compensated to 25 °C. The transmitter send the measured values to the PLC on its analogue output. The water goes through the treatment process and enters into the clean water tank where we measure the conductivity again to see if the treatment process brought the conductivity value into the allowed values. In the clean water tank the water temperature is higher then the incoming water and the measured value needs to be compensated to 25 °C. The second transmitter send the values to the processing unit using Modbus protocol and the data can be analyzed.





14. OPERATION AND MAINTENANCE

14.1. Operation

This isolator requires no user adjustments during commissioning. It comes with factory calibration ready for use.

If the isolator fails to operate, check for bad connections. In the unlikely event of the isolator not working, it should be returned to the supplier for repair or replacement.

14.2. Maintenance

Levtech suggests a quick check for terminal tightness and general unit condition. Always adhere to any site requirements for programmed maintenance.

15. WARRANTY DISCLAIMER

Levtech ("The Company") makes no express, assumed or legal warranties (including any warranty of merchantability or of fitness for a particular purpose) concerning any goods or services sold by the company. The company disclaims all warranties arising from any course of dealing or trade usage. Any buyer of goods or services from the company acknowledges that there are no warranties implied by custom or usage in the trade of the buyer and of the company. Moreover, any prior dealings of the buyer with the company do not imply that the company warrants the goods or services in any way.

Any buyer of goods or services from the company agrees with the company that the sole and exclusive remedies for breach of any warranty concerning the goods or services shall be for the company, at its option, to repair or replace the goods or services or refund the purchase price. The company shall in no event be liable for any consequential or incidental damages even if the company fails in any try to remedy defects in the goods or services, but in this case, the buyer shall be entitled to no more than a refund of all monies paid to the company by the buyer for the purchase of the goods or services.

Any cause of action for breach of any warranty by the company shall be barred unless the company receives from the buyer written notice of the alleged defect or breach within ten days from the earliest date on which the buyer could reasonably have discovered the alleged defect or breach.

16. CONTACT INFORMATION



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ADDRESS

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COMPANY DATA

LEVTECH SERVICE & PRODUCTION SRL Fiscal code (CIF): RO35733217 Trade Register: RC J19/134/2016 IBAN: RO39RNCB0152150349440001 BCR BANK